NISTTech

Nanometrology for Particles, Lines, Arrays and Overlays

Through-focus Optical Image Map Method for Optical Metrology, Defect and Overlay Applications

Description

This sizing technique utilizes a relatively inexpensive optical microscope to quickly and cheaply analyze nanoscale dimensions with nanoscale measurement sensitivity. Termed “Through-focus Scanning Optical Microscope” (TSOM) imaging, the technique has potential applications in nanomanufacturing, semiconductor process control and biotechnology.

This new imaging technology requires a research-quality optical microscope, a camera and a microscope stage that can move at preset distances. The setup can be implemented in under $50,000, which is much less expensive than electron or probe microscopes currently used for measuring materials at the nanoscale. This method is another approach to extend the range of optical microscopy from microscale to nanoscale dimensional analysis. So far, sensitivity to a 3 nm difference in line widths has been demonstrated in the laboratory.

Applications

- **Nanomanufacturing and Biotechnology**
  Measure consistency in size and shape of nanomaterials
- **Semiconductor Manufacturing**
  Measuring nanoscale dimensional differences in line height, width or side-wall angle

Advantages

- **Inexpensive**
  Implementable for under $50,000
- **Rapid**
  Quickly assess differences between two or more nanoscale objects

Abstract

An optical method with the potential to discriminate between changes in the physical parameters of a target as represented in the properties of light scattered

off of the target. For example, whether a change in the scattered light is due to a change in the height or width of a line.

Inventors

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Related Items

- Article: Future Fab
- Nanoscale Dimensioning Is Fast, Cheap with New NIST Optical Technique

Status of Availability

This technology is available in the public domain.

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